

1.932
A2B89

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Agricultural and Industrial Chemistry
Washington 25, D. C.

July 9, 1951

BUREAU MEMORANDUM NO. 424

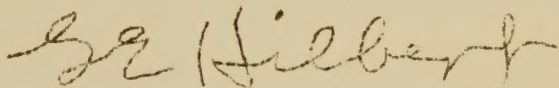
Recent Developments in BAIC Research

on New and Extended Uses for Farm Products

TO ALL PERSONNEL, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

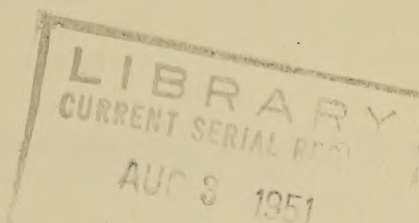
About two years ago, in Bureau Memorandum 415 ("New Uses and Better Markets for Farm Products", April 15, 1949), I invited your attention to sixteen Bureau research developments that had gone into commercial use during the preceding twelve months. Those brief descriptions of products and processes resulting from our investigations seemed to interest many of you, and I have felt that another memorandum of similar content, bringing the story of Bureau developments adopted by industry up to date, might be worthwhile.

Accordingly I submit for your information the attached summary of twenty-two further developments of the Bureau's research. This selection includes only the more important products, processes, and items of equipment recently developed in our laboratories that are now in commercial production or use, or being actively considered for adoption by industry.



G. E. Hilbert
Chief of Bureau

Attachment



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL RESEARCH
BUREAU OF AGRICULTURAL CHEMISTRY
WASHINGTON, D. C.

May 1, 1931

MEMORANDUM FOR THE DIRECTOR

Recent Developments in Milk Research

On the and External Uses for Milk Products

TO ALL PERSONS, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

From your report of the Bureau Conference held at the Bureau of Agricultural Chemistry, April 15, 1931, I learned that you attended to the Bureau Research Development and had your own share in the progress of the work. These data descriptions of products and processes resulting from our investigations seemed to interest you of late, and I have felt that another meeting of similar character, dealing with the study of Bureau developments adopted by industry, might be desirable.

Accordingly I should like your information the attached summary of recent and further developments of the Bureau's research. This report includes only the more important results, some of which are of a preliminary nature, and some of which are of a more definite character. It is hoped that you will find this summary of interest.

W. A. Miller
Chief of Bureau

Attachment

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

RECENT DEVELOPMENTS IN B.A.I.C. RESEARCH

ON NEW AND EXTENDED USES FOR FARM PRODUCTS

The products, processes, and items of equipment described briefly here are results of investigations by the Bureau of Agricultural and Industrial Chemistry to find wider uses for farm-grown commodities. They include only the more important developments of this research that have been adopted by industry during the past two years, or that are now undergoing test for possible commercial production or use. This statement was prepared July 9, 1951.

* * * * *

Surgical Sponge from Starch

Extensive clinical tests by physicians have demonstrated that a sponge-like product made from starch has unusual value as a hemostatic and therapeutic agent. Several pharmaceutical concerns are now making plans for starch-sponge production. The manufacturing process is based on the fact that a mixture of starch and boiling water, to yield a paste, can be given a sponge-like form by relatively slow freezing, at temperatures between 28° and 3° Fahrenheit, followed by thawing. Starch sponge has a number of qualities that make it effective in the control of bleeding. Its most important property is that it is absorbed by body tissues. Thus, starch sponge impregnated with drugs, such as sulfathiazole, can be left in wounds to supply prolonged medication. A development of NRRL.*

Canned Dates

Pasteurized canned dates, which retain the color and other qualities of fresh dates, are a new food product now on the market as a result of Bureau research. In packing these dates, nitrogen is used to replace oxygen in the container. This process prevents the darkening that is characteristic of dates packaged by ordinary methods. A development of the Pasadena laboratory.*

* See last page for full names of laboratories and key to abbreviations

Important New Plant Source of Hormones

Tomatidine, a substance isolated by Bureau researchers from tomato plants, promises to be a readily available and perhaps inexpensive source of the medically important sex hormones progesterone and testosterone. Investigations by the National Institutes of Health, undertaken at the Bureau's suggestion, show that these hormones can be synthesized from tomatidine by relatively simple procedures. Work on this constituent of tomato plants "which the Bureau also found has antibiotic properties) began in 1945. Characterization of the purified extract as a steroidal secondary amine indicated that it might be a possible source of various hormones, including cortisone. Synthesis of the sex hormones from tomatidine by NIH followed as part of the general program of cooperative research on development of plant precursors of cortisone and other hormones. A development of the Beltsville laboratory.

Improved Cotton Opener

Lint cotton is received at textile mills in tightly packed bales and must be opened, or fluffed up, before it can be cleaned and made ready for further processing. A novel cotton opener developed by the Bureau does this job more effectively than any machine previously available. It is particularly useful for opening machine-harvested cotton, which normally has a high trash content, because it makes this cotton much easier to clean than when opened by conventional equipment. At least two manufacturers are building improved openers of this type, and several other concerns have applied for licenses to produce the device under a public-service patent obtained by the Bureau. With few exceptions, this development has created more interest in foreign countries than any other recent accomplishment of the Bureau. A development of SRRL.

Frozen Concentrates Apple Juice

Cooperative research by the Bureau and other organizations, done in part under RMA, has led to the development of full-flavored, frozen, apple-juice concentrate. This new product offers a wider outlet for apples, particularly those of the Delicious variety, which have heretofore been unsuitable for processing. Volatile apple-flavor essence, recovered during concentration of the juice, is used to give the product its appetizing natural flavor. Frozen concentrate from western-grown apples is undergoing marketing tests on the West Coast, and a similar product from eastern-grown apples is already in commercial production. A development of WRRL and ERRL in work undertaken jointly with the Washington State Apple Commission, Washington State College, the Bureau of Agricultural Economics, and apple growers and processors in the East and West.

Soil-Resistant Treatment for Cotton

A simple treatment that makes cotton goods harder to soil and easier to launder has been developed through Bureau-sponsored research. This treatment has been applied successfully by commercial laundries and should eventually be available for home use. It consists of the addition of a small amount of the compound carboxymethyl cellulose (also known as "CMC") to the final rinse water each time cotton goods are washed. The chemical helps cotton resist soiling and aids in soil removal during subsequent laundering. A development of the Institute of Textile Technology, Charlottesville, Va., in RMA contract research done under the supervision of SRRL.

Calcium Carbonate-Starch Mixture for Candy Molds

Starch has long been used to make molds for casting certain types of candy. Candymakers have had difficulty in combating a serious dust-explosion hazard in candy plants. Bureau research has shown that mixing food-grade calcium carbonate with starch makes it safer for candy molds. The Food and Drug Administration has indicated no objection to the use of calcium carbonate in the amounts required. This compound can help in maintaining high standards of sanitation in candy plants and will reduce the danger of starch-dust explosions, which should result in lower insurance rates for candy manufacturers. The candy industry is currently much interested in this development and early commercial adoption of the Bureau's findings appears likely. A development of SRRL, working in cooperation with the National Confectioners' Association.

Super-Flavored Maple Sirup

A practical method has been devised by the Bureau to increase the flavor of maple sirup four to six times without altering its characteristic taste quality. This high-flavored maple sirup can be used in the preparation of economical blends that are practically indistinguishable in taste from pure maple sirup. A Farm Bureau cooperative in one State and a large maple grower are now producing this new maple product, and a number of other companies have indicated their intention to enter the field. High-flavored maple sirup offers the possibility of widely extended markets for this farm-produced food product. A development of RMA research by ERRL.

Permanent Color Standards for Maple Sirup

An important aid in marketing maple sirup are the new glass color standards, developed through cooperative research under RMA by the Bureau and the Production and Marketing Administration. These reliable, convenient, permanent glass standards, used in color comparators for grading maple sirup, are now employed widely in producing areas. They replace the unstable liquid standards previously available and promote more uniform marketing, which benefits both producers and consumers of maple sirup. A development of ERRL.

Froth-Flotation Cleaning of Sweet Corn

The Bureau's froth-flotation process for removing nightshade berries and other contaminants from vined green peas, which was successfully adapted for cleaning lima and soy beans, has proved highly efficient also in the cleaning of cut sweet corn for canning. In this process the corn itself acts as a foaming agent, making the addition of oil or detergent to the water cleaning bath unnecessary. Damaged kernels, corn-ear worms, and other foreign material are effectively floated off with the foam, leaving the whole corn kernels clean and uncontaminated. Several canning plants are now using this process for corn. A development of the Pullman laboratory and WRRL in cooperation with the corn-canning industry.

New Resin-Acid Derivative

Through chemical treatment of cleaned pine gum, the Bureau has developed a new resin-acid derivative, maleo-pimaric acid, which has several potential uses. It has been found particularly valuable in the production of synthetic resins and emulsifying agents, and as a special component of plastics. This compound is expected to be in large-scale commercial production soon. A development of RMA research at the Olustee Station.

Vitamin B₂

The Bureau's process for producing vitamin B₂, or riboflavin, by fermentation with a yeast-like organism is now being used extensively by industry. This vitamin is another important feed ingredient. Its production utilized a number of agricultural byproducts, including corn sugar, corn steep liquor (a starch-industry byproduct), and grain-fermentation residues resulting from the production of alcohol. These substances are used as nutrients for the growth of the riboflavin-producing organism. A development of RMA research by NRRL.

Vitamin B₁₂

Vitamin B₁₂, or the "animal-protein factor", is an essential ingredient of mixed feeds for livestock. In research under RMA the Bureau has discovered several microorganisms that produce this vitamin and has determined optimum conditions for their growth to obtain good yields. One organism isolated by, and a fermentation procedure developed by, the Western Regional Research Laboratory, have been furnished to a plant on the West Coast, which uses them in commercial production of vitamin B₁₂ from blackstrap molasses. The Northern Regional Research Laboratory has isolated another organism and developed a method for its production of vitamin B₁₂, using various grain byproducts in the culture media. This development is also in commercial operation.

Loom Attachment for Weaving Dense Cotton Fabrics

Bureau specialists have perfected a device for standard looms that permits the weaving of extra-dense cotton fabrics. Textile manufacturers are showing an active interest in both the loom attachment itself and the "high-pickage" fabrics produced with it. These fabrics have many more filling threads per inch than the usual closely woven cotton goods. They appear especially promising for use in cotton goods designed to resist wind and rain, such as outer clothing, tents, and tarpaulins -- all important items for the armed forces. A development of SRRL.

Boxboard from Straw Useful for Wire-Bound Containers

Experiments in cooperation with industrial firms demonstrated that the low-grade wood veneer used in making wire-bound shipping containers can be replaced satisfactorily with panels of an improved straw boxboard having the edges protected with sheet metal. In this use, straw boxboard could replace much of the 1.5 billion square feet of wood veneer needed annually for wire-bound boxes and, at the same time provide a use for about 500,000 tons of surplus wheat straw. In performance tests by an industrial research laboratory, wire-bound boxes made from the improved straw boxboard according to the standard design and containing loads of 100 to 200 pounds withstood dropping and rough handling as well as the boxes made from like thickness of wood veneer. The improved straw boxboard was developed by NRRL.

Worthwhile Uses for Pear Waste

The Bureau is making a multi-pronged attack on the problem of converting pear-cannery waste from an acute disposal problem to an asset. Considerable progress has been made recently in this research, conducted partly under RMA. In Oregon, the Bureau has worked with a farmer cooperative in packing more than 1,400 cases of pears in syrup prepared from pear-waste juice. In California, cooperative research with a canners' organization demonstrated the commercial feasibility of a process for manufacturing molasses and dry pomace from the waste. These byproducts can be used for livestock feed. Developments of WRRL and the Pullman laboratory.

Fungal Amylase

A mold-produced enzyme, fungal amylase, employed in converting starch to sugars for the production of alcohol by grain fermentation, is now in commercial use. It serves as a replacement for malt in fermentations and results in a saving of 3 to 5 cents per wine gallon in the cost of producing industrial alcohol. This substance and methods for using it were developed by the Bureau in cooperation with an industrial-alcohol producer, partly through contract research under RMA. In commercial-plant runs, involving preparation of 100,000 gallons of mold-enzyme liquor and its use on about 20,000 bushels of corn, yields of alcohol proved equal to or somewhat greater than those obtained with barley malt. The company that made these plant-scale trials of fungal amylase is now converting its entire operations to this process. Capacity of the plant is about 4 million bushels of grain annually. A development of NRRL.

Mold in Berries Retarded

In order to protect berries from contact with mold growth on wooden berry-picking boxes (hallocks), used for transporting berries to the processing plant, an improved wax composition was formulated, and proper conditions of temperature and time were determined, for impregnating the wood with wax to prevent absorption of juice. The satisfactory experience of one commercial berry producer who used the treatment last year has induced at least four others to use it this year. A development of WRRL.

Alfalfa Drying

Stabilization of the carotene content of alfalfa is a problem of great importance. The use of an oil spray as a carrier for the antioxidant is being studied. The main problem is still unsolved, but the tests with oil yielded a most interesting contribution to alfalfa dehydration. Oil spraying was found to keep down dust, with resultant advantages from the health and fire-hazard standpoints. Therefore, alfalfa dehydrators are rapidly adopting the oil-spray procedure. An accomplishment of WRRL.

Poultry-Feather Meal

Feathers constitute a troublesome disposal problem in the poultry-processing industry. In cooperation with interested industrial groups, a cheap, simple process was developed for converting wet feathers to feather meal, a dry stable product that is useful as a fertilizer material and plaster retarder and, after modification by acid, as a foaming agent for the control of oil fires. A development of WRRL.

Better Oleic Acid for Industrial Uses

A process for the economical production of high-purity oleic acid from inedible animal fats has been adopted commercially after being developed through the pilot-plant stage in the laboratory. This improved technical grade of oleic acid has important uses as a raw material for manufacturing industrial chemical products such as plastics, resins, lubricants, detergents, and plasticizers. A development of ERRL.

Starch Coating for Dried Carrots

A light coating of starch has been found to protect the color and maintain the high vitamin content of dehydrated carrots. The starch is applied before dehydration by treating the diced carrots directly after blanching (scalding) with a 3-percent starch solution. Different kinds of starch are equally effective. Apparently the dried coating inhibits the diffusion of air into the pieces, which ordinarily is responsible for oxidative changes that result in loss in color and flavor. Several commercial processors of dried carrots are applying this starch-coating preservative treatment. A development of WRRL.

NAMES OF LABORATORIES AND KEY TO ABBREVIATIONS

The research developments described above are products of the following laboratories. A number of other laboratories are maintained by the Bureau in addition to those listed.

ERRL -- Eastern Regional Research Laboratory,
Philadelphia 18 (Wyndmoor), Pa. Dr. P. A.
Wells, Director.

NRRL -- Northern Regional Research Laboratory,
Peoria 5, Ill. Dr. R. T. Milner, Director.

SRRL -- Southern Regional Research Laboratory,
New Orleans 19, La. Dr. C. H. Fisher, Director.

WRRL -- Western Regional Research Laboratory,
Albany 6, Calif. Dr. M. J. Copley, Director.

Beltsville -- Biologically Active Compounds Division,
Agricultural Research Center, Beltsville, Md.
Dr. T. D. Fontaine, Head.

Olustee -- Naval Stores Research Station, Olustee,
Fla. Mr. E. L. Patton, Head.

Pasadena -- Fruit and Vegetable Chemistry Laboratory,
Pasadena 5, Calif. Dr. E. A. Beavens, In Charge.

Pullman -- Fruit and Vegetable Products Laboratory,
Washington State College, Pullman, Wash. Dr.
A. M. Neubert, In Charge.

RMA -- Research and Marketing Act of 1946.